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ABSTRACT

As many of the physical problems of space travel are solved, scientists are beginning to address the psychological needs of the astronauts. While the last decade has produced technological advances making space travel and work a definite possibility, psychologists and the public are largely unaware of the psychological and socio-psychological implications of space travel. Space psychology is a new field offering numerous applied and research opportunities for psychologists including personnel selection and in-flight and post-flight counseling. Counselors will be faced with new difficulties which only time and experience can solve. Additional training and skill development will be needed. Lessons learned from working with returning veterans and submarine sailors can be useful. Current National Aeronautics and Space Administration (NASA) psychologists and those in parallel areas, e.g.,the armed services, should pool their expertise and begin training new students for work in this area. If psychologists and educators begin now to prepare for some of the changes brought about by space travel, human adjustment to space will proceed smoothly. (JAC)

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SPACE PSYCHOLOGY: A NEW FRONTIER

Implications for the Profession of Psychology

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Running head: Space Psychology: A New Frontier

Abstract

As humankind develops and expands to greater limits, so too must the realm of psychology grow to keep pace with these changes. Only in this way will psychology, as a field of study and as a profession, always be assured a continued growth and existence. One present area of expansion for the human race deals with space travel. The last decade has witnessed tremendous technological advances, making space travel and work not a science fiction phenomena, but a definite reality. Unfortunately, many reports of our most recent developments are confined to technical reports compiled by the National Aeronautics Space Administration (NASA) and other technical and confidential agencies. Overall, the psychology public, and the public in general, is unaware of our recent space progress and ignorant of the tremendous psychological and socio-psychological implications existing in this area. The present article examines recent space progress in light of its potential effect on the psychological well-being of humankind. Also discussed, is a rationale for expanding psychology into space with regards to current and future psychological needs. Finally, the growth and development of Space Psychology is discussed with respect to the numerous opportunities created (e.g. employment opportunities) for research and applied psychologists.

SPACE PSYCHOLOGY: A NEW FRONTIER

Implications for the Profession of Psychology

Understandably, when individuals first started to explore space, research scientists were primarily concerned with the physical well-being of the astronauts. The question was simply, "Could astronauts survive in an outer space environment?" Consequently, a large proportion of the early research in space travel dealt with the biomedical effects of space travel on astronauts. The first opportunity to study, in detail, the effects of space flight on astronauts occurred during the 14 day long Gemini 7 flight (NASA, 1981). Some of the significant biomedical findings in the Gemini Program included the discovery of a moderate loss of red blood cell mass, a minimal reduction in bone density, and a minimal loss of bone calcium and muscle nitrogen. During the Apollo missions some astronauts developed disturbances of the inner ear. Also, during these missions space motion sickness was a significant problem (NASA, 1981). NASA scientists continue, with vigor, to research this important area of physical health. As it stands now tremendous progress has been made. For instance, while in space astronauts now undergo planned exercises daily to compensate for the potential muscle atrophy caused by the lack of gravity.

As many of the physical effects of space travel are slowly ironed out, scientists are beginning to realize that physical health

is not their only concern. What about the astronauts mental health? Their psychological well-being? As the time nears where individuals will be stationed on space factories (or stations), and where one's stay may extend months, even years, there arises an increasing need to study how these individuals, and their families on earth, will adapt to this very new way of life.

CURRENT PROGRESS IN SPACE RELATED PSYCHOLOGICAL RESEARCH

Many psychologists believe that common space travel is too far in the future to start worrying about its psychological implications. It is the personal belief of the present authors that most earthlings don't realize how really close we are to common travel and work in space. With our limited supply of natural resources running scarce, it is also a matter of necessity that we begin taking advantage of the natural resources found in space and on other planets. It is estimated that by the end of this decade the shuttle-orbiter craft will be on a weekly excursion to space (Cheston & Winter, 1980). In a recent article appearing in the New York Times (7/19/83, C3), James M. Beggs, Administrator of NASA, expressed confidence that President Reagan would soon approve funding for an American manned/womanned space station. Mr. Beggs envisions the space station being in operation by 1991. With possible living in space only about 10 or so years away, the present authors believe that it could be a costly mistake to delay investigating the psychological and socio-psychological effects of space travel until the problems actually land in our laps.

Now is the time to begin examining how space travel will affect the way individuals (and society) behave, think, and feel. In this way, when the time for common space travel arrives, we will be ready to adapt to a moderated way of life.

Fortunately, there are a number of researchers who have already begun to explore the psychological consequences of space travel. Helmreich, Wilhelm, and Runge (1980) report that in the past, psychological adjustment to conditions in space has been good. However, these same authors emphasize that future space travel will necessitate changes in crew composition, and that consequently more problems in psychological adjustment can be anticipated during future space missions. One of the foremost experts in the field, Alexei Yeliseyev, the Russian space flight director, has asserted that the only barriers to long-duration space-flights are psychological (Washington Post, 1978). Most researchers in this area expect more psychological adjustment difficulties unless preventive strategies are adopted (see for example, Fraser, 1968; Space Science Board, 1972; Aldrin, 1973; Cooper, 1973, 1976; and Cunningham, 1977).

Some of the anticipated adjustment difficulties deal with changes in crew composition (Helmreich et al., 1980); changes in the purpose of space missions (O'Leary, 1970); change in the costs and rewards of space flight (Helmreich et al., 1980; Helreich, 1974); potential crowding and privacy in space habitats (Sieber, 1980; Cooper, 1976; and Helmreich et al., 1980). One

important area for research arose when astronauts aboard the Skylab complained about their lack of leisure time, and how the time restrictions were negatively affecting their work (Cooper, 1976). Runge and Helmreich (cited in Helmreich et al., 1980) have investigated sex differences with regard to leisure activity; the authors discuss the need to provide future space travellers and workers with a variety of leisure activities.

The above are just a few of the areas that are beginning to concern researchers interested in the psychological well-being of space travellers. However, this field is relatively new, and questions are just beginning to be raised. A major point of the present paper is to emphasize that Space Psychology is a new and growing arena for psychologists and students of psychology. As the reader may have surmised, there exists numerous applied and research opportunities for psychologists in the field of Space Psychology. The remaining portion of this paper will outline and briefly discuss some potential uses for psychologists in this widely expanding and growing area.

WHERE WILL PSYCHOLOGISTS FIT IN?

Personnel Selection. Selection of space travellers in the past has been limited to a relatively few, highly trained, and physically fit group of male pilot/astronauts. As mentioned earlier, in a few years there will be a space shuttle-orbiter craft taking off every week. This increased frequency of travel will necessitate

the physical and psychological preparation of hundreds, even thousands, of new space travellers. Space travel will soon be open to a wider, more heterogeneous group of individuals. Women astronauts have already been slated for future space missions, and one, Dr. Sally Ride, has already flown on the shuttle. Soon members of various ethnic and racial groups will likewise be scheduled for forthcoming flights. How will NASA select future space travellers? How will crews be matched? What type of personality characteristics are most advantageous for one's smooth adjustment to outer space? Can personality assessments such as the Minnesota Multiphasic Personality Inventory (MMPI) or the Thematic Apperception Test (TAT) be of value in selecting space travellers and predicting their space adjustment level? Presently we have no answers to these and numerous other questions. It is obvious that there is a large need for quality empirical research in this area. The area of personnel selection will, in the near future, provide numerous opportunities for psychologists with varied specialties (e.g., Counseling, Clinical, Industrial specialties).

Counselors in Space. As the time nears where space flights will consist of larger, more heterogeneous crews, on space missions of longer duration, new problems will arise. For instance, what does one do in the event of a psychological breakdown during a mission? Smaller crews on smaller missions could always abort the mission and fly home. However, with larger crews working on

a space station, mission abortion may be impossible. This necessitates that the psychological difficulties be handled on the mission. All long space missions with large crews would benefit greatly from having a psychologist(s) along on the mission. The psychologist would not just serve as a crisis counselor during emergencies, but also as a researcher examining individual and group behavior and dynamics throughout the whole mission. As a matter of fact, it would be most advantageous if these missions had teams of research psychologists examining numerous and varied events.

Post-Flight Counseling. At times adjusting to a novel situation can be difficult, and the resulting psychological consequences can be damaging. An example of this sort occurred during the Vietnam war. Many of the soldiers going to Vietnam did not know what to expect once there; for many, there was an uncertainty as to why they were even fighting in this war. The soldiers were not psychologically prepared before going to Vietnam, and they were not adequately debriefed and worked with upon their return to the states. As a result of the trauma of Vietnam, a number of veterans had developed what the Diagnostic and Statistical Manual of Mental Disorders calls "Post-traumatic stress disorder". Symptomatology of this disorder include the reexperiencing of past traumatic events having occurred during the war. This disorder even affected nurses in Vietnam. Perhaps if the soldiers could have been better briefed and debriefed, the psychological consequences could have been minimized.

Another example in which a unique situation caused psychological distress was seen with sailors stationed in submarines. The confinement and isolation of the submarine was too much to handle for some sailors. There were sailors who had psychological breakdowns aboard the submarines; and many of those who did seem to adjust on board would develop psychological difficulties after the war was over. Society in general, and the psychology profession in particular, has learned from these two examples; and it is hoped that the increased knowledge gained from these experiences will facilitate and enhance the preparation of individuals for future space travel and work.

Regardless of our increased knowledge gained from past experiences, it is plausible to expect that for some space travellers, return to earth after a 6 month, 1 year or 5 year work stint on a space station will not be an easy task, readjustment may be difficult. Hopefully, in the personnel selection procedures many of the individuals who may be prone to readjustment difficulties (or difficulties in general) will be screened out. But no selection procedure is full proof, not now and not in 10 or 20 years from now. Thus there will be a need to help some returning space travellers readjust to earth; there will be a need for quality and timely counseling. Also, what will the long term effect be, say 10 or 20 years once back on earth? There will be a need for quality follow-up studies.

A Space Psychologist -- Will S/He Need To Be Special? Is the present day counselor or psychologist equipped and qualified to handle space related human psychological difficulties? The present authors think not. As with the returning Vietnam veteran and submarine sailor, novel symptomatologies will arise. Counselors will be faced with new difficulties, and only with time and experience will they become truly effective and efficient in dealing with space related psychological problems. Psychologists will have to be prepared to leave their comfortable office and fly to a space station. They will need to adjust to field work, that is, mingling and working with space travellers on these missions.

It's probable that many, if not most of a counselor's basic skills will be generalizable to emotional problems in space. But additional training and skill development will be needed if a counselor is to be fully effective in dealing with problems accruing from space travel and work. At this stage, psychological practitioners researching potentially similar phenomena, such as submarine related difficulties, are probably the most well equipped to counsel space travellers with emotional problems. The isolation in a submarine may parallel the confinement found on spaceships and space stations. (Although many science fiction movies and books portray space stations as large and comfortable working environments, because of sheer expense the first space factories and stations will be rather limited in comfort and area).

Eventually, as more and more individuals travel to space, there will be a need to prepare more psychologists for work in this field. Thus it is hoped that the current few NASA psychologists and those in potentially parallel areas (e.g., armed service psychologists working with soldiers on isolated posts, such as the Antartic) will pool their knowledge and expercise and begin training new psychologists and graduate students for work in this area. Eventually then, there will be a need to develop specialized training programs for psychologists working with space related emotional problems.

Summary

As one can sense from reading this article, there is and will be a large need for mental health services with the advent of increased space travel. Currently, the profession of psychology is doing very little to increase our understanding of the potential effects of space travel on the human psyche. One reason for our lack of involvement is simply our unawareness: we are so wrapped up in our current research endeavors that sometimes we fail to look a decade or two in the future. By starting now to investigate the effects of space travel on people we will be able to side-step many of the adjustment difficulties that are bound to arise. Educating the general populace as to our current progress and future endeavors in space travel will prevent alarm and total surprise when, for instance, the time comes when one of our family members decides to go work on a space station for a year.

Research and applied psychologists will be involved in every aspect of space travel. Figure 1 presents a schematic diagram of possible involvement for the psychology profession.

Insert Figure 1 about here

Phase 1 will involve the general education of college and high school students in the potentials of space travel. Career opportunities for work on space missions (and stations) will be presented to the students. This phase will also educate the public in general, as to our recent space progress and the physical and mental status of the space travellers.

In Phase 2, those individuals who became interested in space travel and work will apply for jobs on future space missions. This will necessitate personnel selection procedures. This phase also includes pre-flight emotional preparation. This area is an important one for researchers.

Phase 3 takes place on the actual space missions. Here, applied and research psychologists will be busy working with and observing human behavior in an outer space environment. Quality empirical research is a must for this stage.

Phase 4 deals with applied and research psychologists working with those family of loved ones of the space travellers who have remained on earth. For instance it may be quite

traumatic for a mother or father whose son or daughter is working a million miles away from home for 5 years. This is also another important phase for research.

Phase 5 will involve routine post-flight counseling and debriefing. For those individuals who have a difficult time readjusting to earth there will be more intensive adjustment counseling. Phase 5 is a most important one for research. Research done during this phase will answer questions such as: What type of individuals seem to have the least (or most) amount of difficulty in readjusting to earth life? Was the Personnel Selection Phase (Phase 2) accurate in predicting space behavior and earth readjustment levels? The knowledge gained in research at Phase 5 will act as a feedback loop (see Figure 1) to Phases 1 & 2. Perhaps our space traveller selection process will need to be modified; and most likely we will have additional information with which to inform and educate the public.

Phase 6 is the final stage of the model and one of the most essential. Are space travellers affected after 5, 10, or 20 years once back on earth? If an individual's adjustment in Phase 5 appears to be adequate, will it last for some years to come? Are there developmental stages in a successful readjustment to earth? And then again, perhaps there won't be any readjustment difficulties at all? One thing is certain however, only research in this area will answer these and other questions. It has been

documented that some astronauts during the Apollo and Skylab missions readjusted to earth rather quickly, however some did not (Cooper, 1976). What characteristics of an individual's personality can act as a valid and reliable predictor of readjustment level? Only time and quality research will tell. Phase 6 is an essential feedback stage. The knowledge gained here will act as a valuable addition to the early phases of the model.

Concluding Remark

It can't be overestimated how important it is for the psychology profession to begin considering more extensive involvement in the Space Program. Within two decades we may see our own children applying for jobs on space missions. Human life styles will alter, and adjustment to a moderated way of life will need to be made. If psychologists and other educators begin to prepare now for some of the changes that will inevitably arrive, then human adjustment will proceed smoothly. If however, we wait until the year 2000 to begin studying the effects of space travel on the human psyche, we may be in for some unpleasant surprises.

At present there are a few universities in the United States that are working in cooperation with NASA on Space Psychology related research. Having been in contact with NASA officials and researchers on a couple of occassions, the present authors have found them to be most cooperative, and willing to enlist the

aid of university researchers. For any researchers who may be interested in pursuing this area further, it is possible that the future may hold a large potential for grant funding. Funding sources for Space Psychology research would most likely come from NASA, and the Navy and Air Force divisions of the armed services.

This article has raised some questions concerning the psychological implications of humankind's expansion into space. It is hoped that the ideas presented in this paper will serve as an impetus to other researchers to at least think about how modern technology in general, and the advent of space travel in particular, will alter our current way of life.

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Footnotes

The opinions presented herein are the sole responsibility of the authors and do not necessarily reflect the general consensus of NASA, the Armed Services, or the American Psychological Association.

University researchers interested in pursuing this topic further may wish to request a brochure entitled "The NASA-University Program: A Guide to Policies and Procedures", available from the NASA University Affairs Office, Washington, D.C., 20546.

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Figure Caption

Figure 1. Six Phase Model of psychologists' involvement in the space program.

Figure I

6 Phase Model of Psychologists' Involvement in the Space Program